

WHAT IS CLAIMED IS:

1. A method of forming spacers proximate to a gate structure, the method
5 comprising:
forming a first layer over a gate structure and a substrate;
etching the first layer to form a first set of spacers proximate to the gate
structure;
forming a second layer over the substrate, the first set of spacers and the gate
10 structure;
forming a third layer over the second layer;
etching the third layer to form a second set of spacers proximate to the first set
of spacers; and
dry etching the second set of spacers with a plasma, wherein the second layer
15 prevents the etching of the second set of spacers from substantially affecting the
first set of spacers.
2. The method of Claim 1, wherein dry etching the second set of spacers
uses a dry etch chamber with a bias power configured to be less than a source power,
20 such that free radicals in a plasma dominate the plasma in the dry etch chamber, the
plasma being used to etch the second set of spacers.
3. The method of Claim 2, wherein the plasma comprises radicals and
energized ions.
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4. The method of Claim 1, wherein dry etching the second set of spacers
uses a dry etch chamber with a source power of about 700 to about 800 watts and a
bias power source of about 0 to about 50 watts.
- 30 5. The method of Claim 1, wherein dry etching the second set of spacers
uses a dry etch chamber with a pressure of about 50 to about 70 milliTorr.

6. The method of Claim 3, wherein the pressure is controlled by a pump and a throttle valve.

7. The method of Claim 1, wherein dry etching the second set of spacers uses one or more gases with high ionization potentials, the gases creating radicals in a plasma used to etch the second set of spacers.

8. The method of Claim 1, wherein dry etching the second set of spacers uses a dry etch chamber with added gases, the gases comprising:
about 70 to about 80 sccm hydrogen bromide (HBr);
about 20 to about 30 sccm CF₄;
about 30 to about 40 sccm SF₆; and
about 70 to about 80 sccm Helium.

9. The method of Claim 1, further comprising implanting dopants in the substrate on opposite sides of the gate structure to form source and drain areas before forming the first layer.

10. The method of Claim 1, further comprising implanting dopants in the substrate on opposite sides of the gate structure after etching the first layer to form the first set of spacers adjacent to the gate structure and before forming a second layer over the substrate, the first set of spacers and the gate structure.

11. The method of Claim 1, further comprising implanting dopants in the substrate on opposite sides of the gate structure after etching the third layer to form the second set of spacers proximate to the first set of spacers and before etching the second set of spacers.

12. The method of Claim 1, further comprising forming a dielectric layer over the substrate and forming the gate structure over the dielectric layer.

13. The method of Claim 1, wherein the first layer comprises an oxide material.

14. The method of Claim 1, wherein the first layer comprises a nitride material.

5 15. The method of Claim 1, further comprising forming a layer of oxide material over the gate structure and the substrate before forming the first layer.

10 16. The method of Claim 1, wherein the first layer is about 100 to about 1000 Angstroms thick.

17. The method of Claim 1, wherein the first layer is deposited.

18. The method of Claim 1, wherein the first layer is thermally grown.

15 19. The method of Claim 1, wherein the first layer is etched using dry plasma etch chemistries.

20. The method of Claim 1, wherein the second layer comprises an undoped oxide material.

20 21. The method of Claim 1, wherein the second layer is about 50 to about 100 Angstroms thick.

25 22. The method of Claim 1, wherein the third layer comprises a polysilicon material.

23. The method of Claim 1, wherein the third layer is about 100 to about 1500 Angstroms thick.

30 24. The method of Claim 1, wherein the third layer is first etched using a polysilicon dry etch.

25. The method of Claim 1, wherein the second set of spacers are etched using a dry plasma etcher, the etching having polysilicon-to-oxide selectivities of about 20-to-1 to about 100-to-1.

5 26. The method of Claim 1, wherein the second set of spacers are etched using a dry plasma etcher, the etching will not penetrate deeper than about 30 to about 50 Angstrom of the second layer.

10 27. The method of Claim 1, wherein the second set of spacers are completely etched.

28. The method of Claim 1, wherein the third layer comprises a nitride material.

15 29. The method of Claim 28, wherein the second set of spacers are isotropically etched using a dry plasma etcher and the isotropic etching has nitride-to-oxide selectivities of about 10-to-1 to about 25-to-1.

20 30. A transistor structure formed by the method of Claim 1.

31. A system configured to form a first layer over a gate structure and a substrate; etch the first layer to form a first set of spacers proximate to the gate structure; form a second layer over the substrate, the first set of spacers and the gate structure; form a third layer over the second layer; etch the third layer to form a second set of spacers proximate to the first set of spacers; and etch the second set of spacers, wherein the second layer prevents the etching of the second set of spacers from substantially affecting the first set of spacers.

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